

#### ABSTRACT OF THE DISCLOSURE

A vehicle dynamics behavior reproduction system capable of describing accurately behavior of a motor vehicle in a lateral direction even for nonlinear driving situation includes a vertical wheel force arithmetic means (105), a lateral wheel force arithmetic means (110), a cornering stiffness adaptation means (115), a state space model/observer unit (120), a selector (130), a delay means (135), and a tire side slip angle arithmetic means (125). Vertical wheel forces ( $F_{z_{ij}}$ ) and tire side slip angles ( $\alpha_{ij}$ ) are determined by using sensor information and estimated values while lateral wheel forces ( $F_{y_{ij}}$ ) are determined in accordance with a relatively simple nonlinear approximation equation. The lateral wheel force ( $F_{y_{ij}}$ ) and the tire side slip angle ( $\alpha_{ij}$ ) provide bases for adaptation of cornering stiffnesses at individual wheels. Vehicle motion is accurately described to a marginal stability by using adapted cornering stiffnesses ( $C_{ij}$ ) and other information.